

Technical Contacts

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Risk Mitigation and Management

Risk mitigation and management are fundamental steps in any efficient project execution. Systems Engineering in general, and Idaho National Laboratory (INL) Systems Engineering in particular, develops and employs advanced tools and techniques to maximize the efficiency of risk management efforts.

Technical Risk Management

Systems engineers at the INL follow a three-step approach to mitigating and managing risk:

- ▶ **Risk Assessment** – Complex projects at the INL have a high degree of technical risk or uncertainty. Based on tools developed by the Department of Defense and NASA, along with some specific advances made at the INL, technical risks are identified in balance with the Technology Readiness Level (a way of measuring technical maturity) of the system in question to estimate project uncertainty in terms of cost or schedule. This ability is vital in accurately bounding total project costs or schedule.
- ▶ **Risk-Informed Decision Analysis** – In addition to providing information needed for predicting cost and schedule, uncertainty is factored into selection criteria when evaluating two or more alternatives. Historically, decisions have been made based on the best guess of the *performance* of the given alternative with respect to a set of decision criteria that identify the goals or desires of the customer. That best guess may not be the best choice, especially if the decision needs to be made early in a project when the technologies are still maturing. The INL has developed special methods for analyzing and visualizing uncertainty as it relates not only to cost and schedule, but also to other performance criteria so that the range of performance possibility is understood and can be factored into the final decision. This may lead to the realization that the time is not right for a decision, and more information needs to be gathered.
- ▶ **Risk Response and Mitigation** – The final piece to the technical risk management puzzle is the development of the plan to reduce the risk and uncertainty. By linking existing efforts to both known risk resolutions and technology maturity advancement, the overall uncertainty reduction rate of the plan can be predicted and accelerated. Such visualizations, called risk waterfall diagrams, serve to monitor and drive uncertainty reduction.

All of these tools are combined to form a technical risk reduction strategy, sometimes referred to as a *focused roadmap*. The tools can be applied to technical or programmatic risk, including economic, stakeholder, and political risk. Additional details on this capability are available.

